Innovative policies and information and communication technology in secure networks

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4 Innovative policies on information and communication technology in service networks

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4.1 Information and communication technology (ICT) as a prime mover: a paradox

Technological change is one of the principal drivers of competition. It plays a major role in industrial structural change, as well as in creating new industries. It is also a great equalizer, eroding the competitive advantage of even well entrenched organizations and propelling others to the forefront. Many of today's large firms grew out of technological changes that they were able to exploit. Of all things that can change the rules of competition, technological change is the most prominent one.

Despite its importance, the relationship between technological change and competition is widely misunderstood. Technological change tends to be viewed as valuable in itself: any technological modification an organization can pioneer is often believed to be good. Competing in 'high technology' industries is widely perceived as being a ticket to profitability, while other industries that perform with 'low technology' are viewed with disdain. The recent success of foreign competition, much of it based on technological innovation, has encouraged companies even more to invest in advanced technology, in some cases uncritically (Porter 1985).

A tidal wave of change is currently heading towards all industries involved with ICTs, and will ultimately transform the economic, social and political landscape for nearly every person or organization in the world. Some industry players will survive, and others will vanish. Our society is gradually, but undoubtedly, exhibiting signs of a transition towards a network economy. The rapid rise of the service sector, not only for domestic but also for international activities, mirrors the fact that the western world is increasingly marked by a wide variety of communication and interaction patterns ranging from local to a global scale. This

tendency is reinforced by the emergence of the information sector, also denoted as the New Information Technology (NIT) sector or the Information and Communication Technology (ICT) sector (Freeman et al. 1982; Giaoutzi and Nijkamp 1989).

The ICT sector has shaped the conditions for current knowledge based economies. The pioneering study of Machlup (1962), followed by Porat (1977), began to stress the significance of a 'knowledge based' economy in those years when Bell (1973) was signalling the emergence of service dominated economies in our post industrial society. From these early works, a series of theoretical and empirical analyses have emerged, strengthening the idea of a new development trajectory of an economy governed by different rules and actors and dependent upon different (information oriented) strategic resources. Jonscher (1983), for example, sought to explain the emergence of the 'Information Economy' through categorizing economic activities into two classes, viz. 'production tasks' (tasks associated with the manufacturing and delivery of products and services), and 'information tasks' (tasks associated with the coordination and manipulation of production tasks). The major source of added value appears to shift clearly from the production task to the information task.

All these studies witness the emergence of an information economy, characterized by a growth and intensification of activity indicators (such as investment and employment) associated with the collection, manipulation, storage and communication of information. Knowledge based and information based activities are becoming important strategic resources upon which the competitiveness of organizations and comparative advantages for regions increasingly depend (Gillespie et al. 1987). Thus, the modern economy is going through a period of transformation, signalled by the move from 'capital-intensive' to 'information intensive' production systems (Willinger and Zuscovitch 1988), where information and knowledge are inextricably linked strategic sources for economic development.

Much of the change is brought about by innovations in ICTs and by the 'interconnectivity revolution', i.e. the inevitable convergence of computers, communications and information. Those players who anticipate this tidal wave of change and prepare for it will be the ones who will be likely to emerge not just as survivors but even as winners. Though the change may be destructive for some, it will also create tremendous opportunities and growth for many other players. The emergence of the new Network Economy is thus highly dependent upon the widespread diffusion and adoption of new ICTs, born from the interaction of computing and telecommunications, which give rise to new potentialities through storing, manipulating, organizing, visualizing and transmitting information.

Given this perspective, the ICT sector and its future development become critical for the understanding of future economic positions of countries and regions, and thereby of the competitiveness of national, regional and urban territorial and industrial systems in the 1990s. Thus, at first glance, the ICT sector seems to be a promising sector with a high growth potential (Nijkamp 1994).

Paradoxically, empirical analyses on the adoption process of these technologies in the economy demonstrate sometimes a relatively low penetration rate (see Capello 1994). While there has been significant growth in the level of expenditure on ICTs, there remain open questions on the extent to which these technologies are being used and exploited. In other words, there remain uncertainties on the extent to which the new technoeconomic paradigm can be said to have been secured.

The relatively limited diffusion of computer networks is also demonstrated by both official statistical data and primary data. In the United Kingdom in the past years, for example, OFTEL (Office of Telecommunications) publications indicate still a rather limited use of private circuits, central to computer networks, contributing only some ten percent of British Telecom revenues in 1988. Furthermore, 90 percent of private circuits are analogue and these circuits represent 75 percent of private circuits revenues, whereas 25 percent is derived from digital circuits. Moreover, 75 percent of all private circuits are within the same exchange area, while the City of London is the main geographic market. The relatively limited diffusion of computer networks in the past years is also demonstrated by a survey of organizations. Whilst 40 percent of respondents used a computer nework, and over 65 percent of these organizations had installed their computer networks since 1985, the broad diffusion of computer networks into the functional structure of organizations has remained relatively underdeveloped (Table 4.1) (Capello and Williams 1991).

Table 4.1

Use of computer networked appliances in selected functions

Selected applications	Finance	Marketing	Production	Purchasing	Distribution
Data processing	85%	47%	53%	54%	40%
Relational database	30%	25%	21%	14%	12%
Electronic mail	22%	16%	16%	9%	9%
Diarying	10%	9%	9%	5%	3%

Source: Taylor and Williams 1981

This situation which shows a rather limited use of advanced ICT networks and services is not only typical of the United Kingdom. In Europe, in general, the level of digital lines installed by the end of the 1980s, representing the main physical infrastructure for the development of advanced services, is still rather low, although the situation varies considerably from country to country.

Thus, there appears to be a *paradox* with, on the one hand, a growing awareness and focus upon the implications of a new technoeconomic paradigm upon the behaviour and structure of organizations, and on the other hand, a pattern of adoption of ICTs which suggests that there are uncertainties and difficulties in translating these concepts into reality (Capello and Williams 1991). This paradox will be investigated in this chapter. It will start (in Section 4.2) with an

exploration of the barriers and benefits of the adoption of ICTs in a Network Economy. Next, attention will be focused on the strategic position of ICTs in the banking sector (Section 4.3). The chapter aims at developing a methodological framework (from so called constructs to testable hypotheses) which will be used to investigate in detail the development and driving forces of the Italian banking sector (Section 4.4). Some retrospective reflections will conclude the chapter (Section 4.5).

4.2 Barriers and benefits of the adoption of ICTs

Until a few decades ago, the telecommunications industry was rather restrictively defined as the area of production and distribution of voice and text communications, through the telephone and telex services (Pasini 1959). Now, this definition is far too limited and insufficient to explain the characteristics of this rapidly changing industry. The radical technological innovations of the 1970s and 1980s have broadened the range of communications services and instruments, and their technological transfer capacity. Moreover, they have changed the role telecommunications services and infrastructures are playing in the economic system. The pervasive nature of the ICT sector has however, also faced many barriers (OECD 1988).

The nature of such barriers and bottlenecks is strictly linked to the profound changes taking place in the ICT sector. The drastic transition processes force actors, regardless of whether they are users or suppliers, to adjust their behaviour to new market rules, a development which has created problems at both the supply and the demand side. Although technological forces are generally pinpointed as the major causes modifications in the telecommunications sector, an approach to this transformation process focusing only on indigenous technological aspects would fail to conceptualize and describe properly the new characteristics of the ICT sector. At least four factors can be regarded as prominent causes for the transformation of the sector (Capello 1991): technological dynamics, institutional dynamics, market dynamics and new economic relationships. These profound changes provoke, paradoxically, on the one hand high technological potentials, but, on the other hand, also bottlenecks and barriers to the development of high adoption rates. Barriers in the ICT sector concern all phenomena (economic, organizational, technological, cultural, political, etc.) that impede a smooth penetration, adoption and development of the ICT sector. This means that barriers can be interpreted as losses in (marginal) benefits accruing from the use or supply of ICTs. To some extent, barriers act as 'negative production factors' decreasing the maximum possible productivity of conventional production factors (see Nijkamp et al. 1990). Barriers can be external to a certain information system (e.g., language barriers, physical bottlenecks) or internal (e.g., as a result of user externalities like congestion).

From a user's perspective, the rapid increase in communications potentials embodied in the ICTs opens the way to the exploitation of competitive advantages on the basis of the achievement of more information and knowledge. Competitive advantages are now based on the capacities of new technologies to transmit, process, store and elaborate a larger volume of information (Gillespie and Hepworth 1988). Thus, high technological potentials present major opportunities for organizations to achieve competitive advantages.

However, despite general beliefs, these opportunities are not provided by the simple adoption of these technologies, but by their innovative use. The notion of *innovative use* refers to the application of these technologies to produce new products, new processes or new transactional structures (Nijkamp 1994).

The development of on-line services in the banking sector (e.g., points of sale, cash dispensers, home banking, provided by the development of inter-banking computer networks systems) is a clear example of innovative use of these infrastructures. By the same token, process innovation can be generated through the use of these new infrastructures by enabling 'islands of automation' (such as flexible manufacturing systems) to intercommunicate, either within a single site (Local Area Networks) or among a multitude of sites (Wide Area Networks). As a managerial innovation, computer networks operating over space through telecommunication channels have obviously greatly increased the ability of multisite organizations to control and integrate their activities over space (Antonelli 1988; Camagni and Rabellotti 1988; Fornengo 1988; Rullani and Zanfei 1988).

The innovative and strategic use of ICTs, generating positive effects on business performance, is strongly associated with its development to profound organizational changes. In fact, innovative use of these technologies implies the interrelation of technology and organization as two inseparable variables (Mansell 1990; Zeleny 1985). Technologies in themselves appear as neutral devices, as a pool of opportunities available at a given cost, which can be interpreted as some quasi public goods. But what really matters – and what is not at all a public good – is the cultural and organizational capability of exploiting their potentials, through a creative blend of technology devices, organizational styles and business ideas.

To achieve higher economic performance through the use of computer networks, corporate users have to adjust their organizational structure to these new 'routines' and organizational rules (Nelson and Winter 1982). The development of modern networks is thus related to the capacity of organizations to change their organizational routines, and to link the technological trajectories to organizational changes. It is thus very much the case that high rigidity of attitudes and behaviour exists, which hampers an adjustment to new conditions and the exploitation of technologies to achieve a higher economic performance.

A tradeoff exists between the speed of technological development, the profitability obtained by the exploitation of new and advanced technologies, the organizational costs required to use them and the complexity of economic objectives achieved through the adoption of computer networks. The complexity of

technological systems reflects ambitious economic objectives and requires profound organizational adjustments to new technologies and a long penetration speed. Consequently, one may expect a lower speed of diffusion for technologies implemented to achieve more complex objectives, such as higher efficiency and effectiveness, and, moreover, competitive advantages.

As already said, the innovative use of advanced ICTs provides major opportunities for users to achieve the highest economic benefits and advantages from these ICTs. However, the simple adoption of these technologies does not provide an immediate positive effect on corporate performance (Tolmie 1987) and does not help in overcoming the barriers represented by the need to merge the technology with the organizational structure. In fact, because of their capacity to support the transactional structure of an organization, these networks are inevitably able to reshape inter and intracorporate information flows with profound effects on the organization (Bar et al. 1989, Ciborra 1989, Williams 1987).

The best way for users to handle the complex interrelation between technology and organization is the development of learning processes regarding the following aspects (Camagni and Capello 1991):

- technological potential of new technologies;
- possible applications of these new technologies to solve corporate problems;
- possible integration of these technologies in the organizational structure.

These learning processes are the mechanisms to develop among users adoption processes of these new technologies, overcoming the rigidity of attitudes and behaviour associated with transition phases, which hampers an adjustment to new conditions.

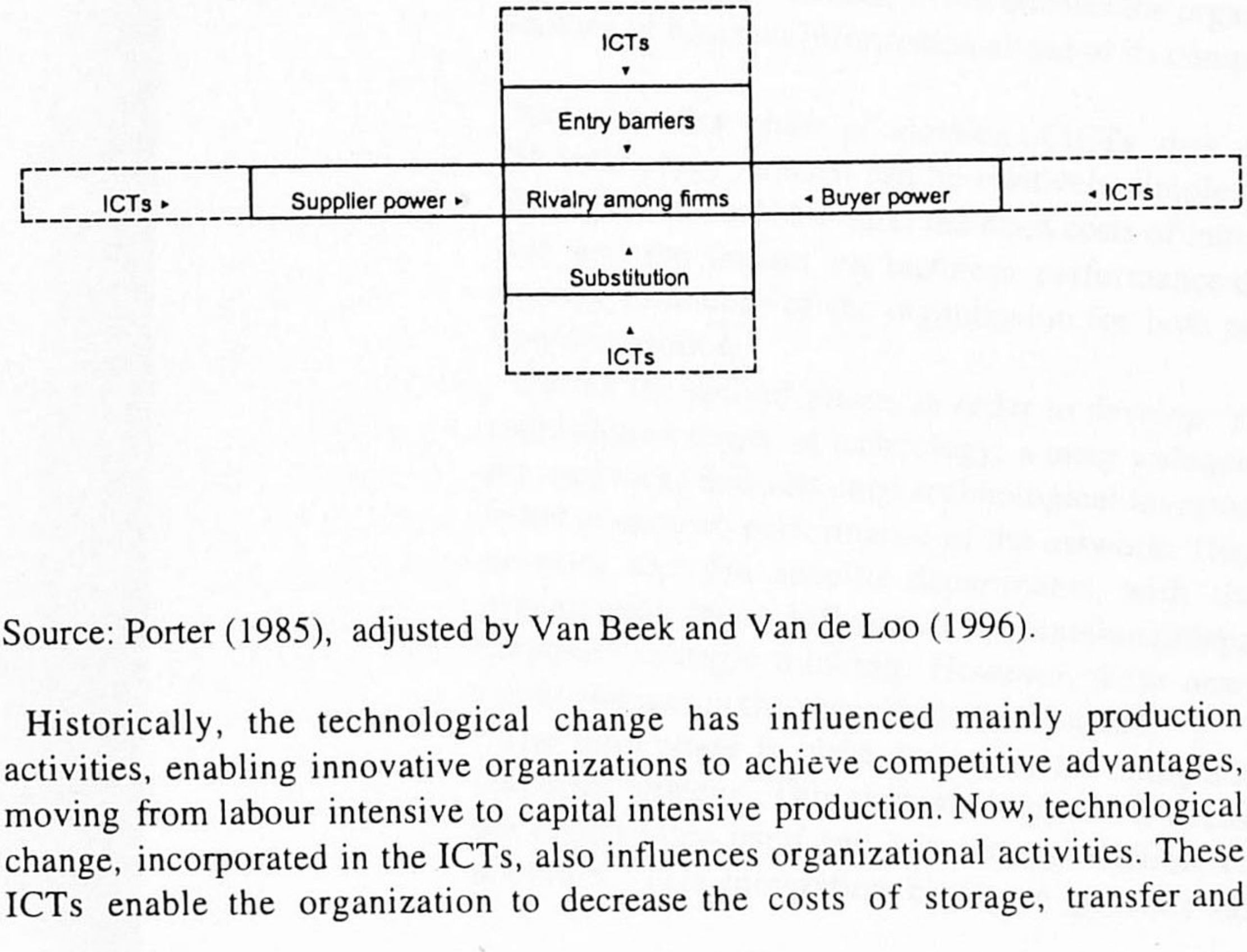
In this context, it may be interesting to refer to Porter (1985), who claims that the basic tool for understanding the role of technology in competitive advantage is the *value chain*. An organization, as a collection of activities, is a collection of technologies. Technology is embodied in every value activity in an organization, and technological change can affect competition through its impact on virtually any activity. Every value activity uses some technology to combine purchased inputs and human resources to produce some output. This technology may be as mundane as a simple set of procedures for personnel, and typically involves several scientific disciplines or subtechnologies. The technology of a value activity represents one combination of these subtechnologies. Technologies are also embodied in the purchased inputs used in each value activity, both in consumable inputs and in capital items. The technology inherent in purchased inputs interacts with the other subtechnologies to yield the level of performance of the activity.

The recent, rapid technological change in information systems is having a profound impact on competition and competitive advantages because of the pervasive role of information in the value chain. Another pervasive technology in the value chain is office or administrative technology, because clerical and other office functions must be performed as part of many value activities. While office technology can be subsumed under information systems technology, it is separated

here because of the propensity to overlook it. A change in the way office functions can be performed is one of the most important types of technological trends occurring today for many organizations, though only a few are devoting substantial resources to it.

The competition, national as well as international, puts much emphasis on ICTs. These new technologies, when adopted in the service sector, present themselves as useful and strategic instruments to achieve higher economic advantages (Capello and Camagni 1989). Indeed, the telecommunication industry has changed its role in the capitalist world. Where the telephone has only changed the *form* of the interpersonal connections by facilitating, supporting, and consolidating the connections, the ICTs change the *nature* of communication, adding a strategic role in the decision making process to these ICTs (Williams 1987). As Jonscher (1983) affirms, the economic activities within an organization can be subdivided into two different groups: *production activities*, which include the production and distribution processes of goods and services, and *organizational activities*, necessary to coordinate the production processes. The first group of activities is based on material resources, while the second group is based on 'information' as a resource.

Table 4.2
ICTs affect the five competitive forces



Source: Porter (1985), adjusted by Van Beek and Van de Loo (1996).

Historically, the technological change has influenced mainly production activities, enabling innovative organizations to achieve competitive advantages, moving from labour intensive to capital intensive production. Now, technological change, incorporated in the ICTs, also influences organizational activities. These ICTs enable the organization to decrease the costs of storage, transfer and

manipulation of information. Porter and Millar (1985) suggest then that ICTs have a great impact on competitive forces – which in turn determine the profitability and change the *nature* of competition among firms. The change in its nature enables economic agents to look for competitive advantages in new ways. The potential effect of technological change on the corporate structure means that an organization cannot set a technology strategy without considering the structural impacts of ICTs on five competitive forces (see Table 4.2).

The strategic role of ICTs in the competitive process, makes the adoption of these ICTs a crucial factor, which no economic agent can deny, at least if that economic agent does not want to collide with significant competitive disadvantages. The impact of ICTs upon business performance can be analyzed in terms of increased effectiveness, greater efficiency and enhanced competitive advantage (Williams 1987).

Efficiency Refers to economic benefits from ICTs, which may lower administrative costs and routinize administrative functions through the possible transmission of simple economic data.

Effectiveness Refers to better management by allowing decisions to be made more simply through codifying, routinizing and automating operational decisions.

Competitive advantage Refers to strategic advantages of ICTs by allowing transmission of information flows necessary for decision makers to construct and evaluate strategic choices, which enables the organization to respond to a variety of sources of business information ahead of its competitors.

During the first phase of adoption of ICTs, data are transmitted on the network and the technology required can be relatively simple. There is no need for changes in the organizational structure; the main costs of introduction are on the technological side and the impact on business performance derives from an increase in the internal efficiency of the organization for both production and integrated production/distribution.

During the second phase, in order to develop 'stand-alone' information, a more sophisticated degree of technology, a more widespread diffusion of the geography of the network, and sustained technological investments are necessary to achieve a better economic performance of the network. There is an interaction between the network and the specific departments, with the information strategy of the organization being influenced by functional/departmental strategies as well as corporate strategic thinking. However, these new electronic applications do not imply changes in the organizational structure.

The third phase is characterized by the integration of information strategy and corporate strategy. This strategic integration necessarily implies the synthesis of the organization itself and between organization, computer networks and business activities. This integration begins to generate sustained competitive advantage,

which will lead to a changing tradeoff between the relative importance of technology and information. In the third adoption phase, the existing technical structure can be added without much additional cost, but nevertheless resulting in large increases in the range of products and services. During this phase however, organizations have to confront difficult internal organizational changes in order to harvest the potential competitive benefits from new ICT investments (see also Table 4.3).

Table 4.3
Taxonomy of ICTs impact on organization and business

Business information	Technology	Organization	Changes	Impact on the production system	Impact on the delivery system
Data	LAN, Analogue private network	Network	High technological changes, and no organizational changes	Efficiency	Efficiency
Stand-alone information	Digital private networks	Organization/ network integration	High technological changes, and low organizational changes	Effectiveness	Short term competitive advantages
Information systems	Cooperative networks	Organization/ network/ business integration	Low technological changes, and high organizational changes	Long-term competitive advantages	

Source: Capello et al. (1990).

Thus the adoption of ICTs within organizational processes has changed radically over the past ten years from a supportive function for the administrative department, towards a strategic function for the entire organization. ICTs can only create added value for the organization if there is sufficient 'strategic alignment', that is, a tight relationship between corporate strategy, organizational structure and processes, and the management of information flows. This strategic alignment can be observed in every adoption phase of ICTs. Each of these adoption phases is accompanied by higher costs, but also higher profits.

The achievement of competitive advantages deriving from ICTs finds its major obstacle in its requirements for profound organizational changes. These organizational changes are necessary if competitive advantage deriving from ICTs, like computer networks, is to be optimized (Capello et al. 1990). In this latter

case, the role of ICTs is to transfer management information for strategic decision making. The use of ICTs at this level requires a change in the nature of the organizations, either vertically, in terms of centralization or decentralization of given functions, or horizontally, in terms of division of labour (Aoki 1986; Simon 1981). Both these horizontal and vertical changes have a significant impact on the spatial organization of different functions. In the specific case of the banking sector, the organizational impact on the spatial organization is understood in terms of transfer of different functions towards branches, rather than a (power) centralization of different functions in the headquarters. To take as much as possible advantage from ICTs, a good match between corporate strategy, information strategy, organizational structure and the information systems is necessary. A good matching process requires good communication between users and information scientists and good coordination on the side of management at all levels of the organization.

In short, the use of computer networks to achieve competitive advantages is contingent upon the integration of enhanced information flows, changed organizational structures, and the orientation of the organization towards the market.

4.3 Strategic position of ICTs in the banking sector

The interest in technoeconomic innovations in the banking sector is based on different motives. The development of innovations in the banking sector is characterized by an overall increasing level of dynamism. This pushes the banks towards strategic organizational innovations and towards the realization of accompanying technological choices (Baravelli 1984). The increasing internal market in Europe and the increasing demand for paying systems create opportunities for higher profitability margins. In the light of the creation of one single European market, the situation of internal dynamism is accompanied by increasing instability. After years of substantial immobility, the prospect of the liberalization of financial movements within the European Community pushes the interest of the Monetary Authorities towards the control of efficiency of the banking system and, indirectly, towards the control of the conditions of competitiveness on the financial markets (Bastasin 1987).

Until the mid 1980s, the banking sector was characterized by a 'culture of stability' profoundly pegged to the concept of institutional continuity. The banks were consolidated in competitive protectionism, externally regulated by the Central Bank. This permitted a hierarchical and centralized power structure, suitable to face situations of scarce environmental dynamism and of substantial economic stability (Munari 1980). In recent years, the evolution of national and international markets has created the development of new strategies in the financial sector. These new strategies are linked to a competitive environment whose rules will govern the banking sector. Next to the environmental instability of the banking sector, one

may observe a level of maturity of the financial services, which limits the possibility of competing on aspects like quality and originality of the services offered. Indeed, the predominant part of the banking activities – i.e. collection of deposits, lending and stock management – are mature activities, characterized by an actual rate of growth nearing zero and characterized by rather limited possibilities of differentiation, given their added value (Mottura 1986).

The introduction and the evolution of new technologies seems to be one of the variables to revitalize the banking sector. Consequently, banks are facing new opportunities for strategic development and innovations regarding their actual productive and administrative processes. Technological innovation -i.e. product as well as process innovation- embodied by the ICTs, allows banks to achieve higher economic advantages in terms of internal efficiency and effectiveness. Adoption of these technological innovations enlarges the range of services and their quality, and simplifies the internal bureaucratic procedures, and increases the information flows. From this point of view, technological choices influence also the characteristics of the production process, of the division of labour, of the organizational structure, of the operational mechanisms, and of the need for human resources. Problems arise, because an elevated level of flexibility is required from established organizational structures, which, not seldom, behave like slowing-down factors of innovative change (Colangelo 1985; Paolucci 1988; Stacca 1984). Because banks achieve economic advantages from these innovative processes, it is necessary that these processes are managed in accordance with the market.

Table 4.4

Decision making process of an information system

Strategic choices	Overall rules of the game [dimensions, markets, behaviour, image] ∇
Macro-organizational choices	Information system ∇
Technological choices	Communication system ∇
Micro-organizational choices	Organizational changes

Source: Camagni and Capello (1990).

ICTs allow process and product innovation in the production phase through a structure of networks. These networks facilitate the transfer of internal and external information flows, streamlining the information system and making it more efficient. ICTs allow process and product innovation in the distribution phase as well, through new on line services, like home-banking, corporate banking, point of sale and electronic transfer of funds. These new services facilitate the banks'

creation of new customer segments, satisfaction of specific needs, reduction of the operative costs, as well as enlargement of the range of services offered. In turn however, these ICTs require internal organizational changes and new decision making structures, taken on the basis of encoded information transferred over networks. The technological innovations should reflect the consequential logical chain of business choices and rational market strategies. The management of information systems should take the initiative for the subsequent processes, basing their technological choices on more general orientations related to the goals of the bank (Table 4.4).

Therefore, it is inevitable that technological innovation is parallelled by organizational innovation. This is only possible when structures are characterized by a high degree of flexibility. Unfortunately, the actual structures in the banking sector seem to be very rigid, due to an elevated number of hierarchical levels and a centralized power structure, in short a system which can be defined as 'mechanic' (Burns and Stalker 1979). However, to exploit technological innovation within the bank, an 'organic' system seems to be more valid. This organic system is characterized by decentralized power structure, and by vertical as well as horizontal communication, and guarantees a high degree of flexibility. The process of automation in the banking sector relates to the evolution of information and communication sciences, which, in recent years, are flown together in innovations regarding networking and in value added services (Capello 1989). This technical progress, through cumulative and interconnected incremental innovations, forms part of a more general system or 'technological paradigm', in particular microelectronics (Dosi 1982; Camagni 1986).

The technical progress has shown a higher rate of growth in the banking sector than in other economic sectors, because of the existence of favourable factors for its adoption:

- the high volume of daily data and information flows;
- the necessity of quicker communication;
- the high volume of daily operations.

These factors increase when credit intermediation in the economic system becomes more important. All these are phenomena that justified the adoption of ICTs in the banking sector in the 1970s. The strategic element in these adoption processes of ICTs is the increasing integration of machines within organizational processes. This integration finds its expression in the change from stand alone equipment (for the simple bookkeeping of administrative data), to equipment with bigger storage capacity (able to deal with more procedures), over to integration between machines (thanks to a connection of different networks). One may divide the diffusion of automation in the banking sector into three phases:

- mechanization; the phase of data processing;
- automation; the phase of information processing;
- integrated systems; the phase of information systems.

In the banking sector this evolution is still in the initial phase. Furthermore, the objective to achieve higher economic advantages, due to the introduction of ICTs, requires a profound change in the way technological innovations are introduced. In the first place, the objective is no longer to achieve a reduction in the cost of control and of personnel, like the first technological innovations which were typically labour saving. The actual objective is to increase turnover, through the entrance in new niches, with a higher elasticity of demand in relation to profits and a lower elasticity of demand in relation to price, through the approach of new customer segments and through the introduction of new services. In the second place, the modern strategy is no longer based on decisions, which are the result of existing strategies and predetermined organizational processes. On the contrary, the organizational processes have to be interpreted as a variable, which is able to comply with the new demands and problems created by technological changes. The technological changes, in turn, are based on environmental changes. The technology itself has to fulfil a guiding role in the relationship between technological and organizational variables (Saita 1984). The results of this third phase will not be a simple facilitation of normal activities, with a consistent improvement in the quality of the services, but rather an organizational evolution, in which the roles and the level of professionalism will change.

Technological dynamism in the banking sector is the basis for many innovations, which can be subdivided into three types: intrabank innovations, interbank innovations and bank-market innovations. The networks appear to be the structures on which the actual technological development in the banking sector leans. These networks relate to intrabank and interbank information systems, and to information systems with the client.

It is widely believed that the principal effect of ICTs, and in particular new computer networks, is the spatial decentralization of activities. For banks operating traditionally in dispersed geographical areas, ICTs are interpreted as effective instruments for the decentralization of functions to local branches. Direct contact with branches appears to relieve head office of responsibility and decision making through the possible immediate control of the work of all individual branches. Our analysis strongly revises this interpretation; the process of decentralization is the result of very complex problems, certainly not solved by a simple on-line link between branches and headquarters (Van Beek and Van de Loo 1996).

The tendencies in the subdivision of functions among headquarters and peripheral branches are the following:

- The first effect of the use of networks for on line data transmission is the centralization of routine standardized functions, linked to administrative and bureaucratic operations. The existence of a single data processing centre linked by networks to branches involves the centralization of all administrative accounting operations, which can be transmitted in real time with daily revision with the aid of computer networks.
- The availability of resources in branches relieved of administrative tasks has allowed the decentralization of many operations of production and distribution

of services. The 'specialization' of the branches in the distribution of services and the management of contacts with the public, linked to a reduction in traditional counter tasks through the existence of self-service banking, contributes to an increase in the quality and efficiency of work carried out by branches. ICTs tend, moreover, to shift the burden of operations of 'input' of banking transactions from bank personnel to the business customer (interconnections of computers) and to the private customer (automatic teller machines and self-service transactions) in ways which reduce operating costs. Branches thus become typical 'points of sale', concentrating exclusively on contacts with the market, and become real instruments for monitoring demand.

- The headquarters are concerned with the traditional activities of decision making and control, over which the effect of the introduction of computers has only in part produced a decentralization to the branches.

A deeper insight is necessary to explain these tendencies; the new subdivision of activities between headquarters and branches is presented in Table 4.5, which compares the past situation, characterized by automation processes, and the present situation, created by the introduction of networking in the production chain. Technological innovations, in both processes and products, are the new strategic instruments for facing the strong competition in the sector. This forces banks to radically transform their interbank relationships, pushing in two different directions at the same time, *cooperation* and *competition*. The creation of on-line interbank services, with the exploitation of interbank computer networks, requires a high degree of cooperation between banks, without which the introduction of these services would be impossible. On the other hand, these services and ICTs themselves are becoming increasingly competitive instruments through which to supply a wider range of products, to provide a higher quality and efficiency of service, and to enable market niches which represent the specific needs of users to be conquered. Up until now ICTs have mainly pushed towards greater inter-bank cooperation, accepted and managed by banks in order to maintain an image in the market and towards customers. Technological innovation within banks seems to be characterized by the achievement of greater internal efficiency, while the two higher levels of economic advantages seem not yet to be as clearly defined. From the analysis carried out, the adoption of ICTs in the production area seems to be motivated primarily by the objectives of reducing personnel costs, without a clear acknowledgement of the possibilities of ICTs in terms of decision making effectiveness and competitive advantages. The pursuit of adopting ICTs within organizational processes is generally considered to be appropriate only to the extent that it has a positive influence on economic advantages.

However, insight in the achievable economic advantages is considered to be a critical element, on which the decision to adopt ICTs within organizational processes should be based. To date, no attempt has been made to validate the achievable economic advantages associated with adopting ICTs within new

organizational processes. The primary purpose of the sequel of this chapter is to examine empirically, for the Italian banking sector, the relationship between ICTs on one hand (in particular computer networks) and, on the other hand, enhanced information flows, as well as the spatial consequences for the organizational structure and restructuring effects that occur after adoption.

Table 4.5
Centralization/decentralization of different activities: comparison between past and present situation

	Past [Automation]		Present [Automation and Networking]	
	Headquarters	Branches	Headquarters	Branches
Administrative activities		Book-keeping activities; Administrative and bureaucratic activities	Bookkeeping activities; Administrative and bureaucratic activities	
Operating activities	Distribution of specialized services	Distribution of traditional services; Consulting activities and assistance to the client		Distribution of traditional services Consulting activities and assistance to the client: Distribution of specialized services
Control activities	Management control of the branches; Management control of the bank		Management control of the branches; Management control of the bank	
Decision making activities	Strategic and planning activities; Decision making linked to operating activities		Strategic and planning activities	Decision making linked to operating activities

Source: Camagni et al. (1993).

4.4 The adoption of ICTs in the Italian banking sector: methodology and empirics

The Italian banking system is diffused; for instance, there are almost one thousand, relatively small banks. The Italian banking system is in arrears to those of other European countries, for several reasons. Years of stringent regulation in this protected sector has suppressed internal and foreign competition and encouraged inefficiency. Italy's banking system was not well prepared for the integration of financial markets and liberalization of capital movements in the European Community, in 1992. Since then, financial services have been exposed to strong competition, and the country is no longer able to hide behind protectionist barriers. Since this financial liberalization, also other European banks have been allowed to operate according to their own (more liberal) banking law in Italy. To Italian firms and citizens, foreign banks could be more attractive to deal with, for many reasons. To meet the challenges of the future, a major transformation of the Italian banking system is required. The Italian banking sector is a traditional sector, which has recently been developing strategies of revitalization in order to face the challenge of increasing competition. The banking system in Italy is at present characterized by dynamic growth, increasing instability on both internal and external markets, and a high level of maturity of services. Processes of networking, with subsequent phases of modernization, have been added only in recent years to the processes of automation in Italy, present in the Italian banking sector since the 1960s. These networking processes aim to improve the output of organizational processes and the competitive advantage of the banks at the same time. Despite all recent efforts, it is noteworthy that Italian banks, in general, have not yet reached a high level of adoption of ICTs. Therefore, further adoption of ICTs will become an important factor in a bank's strategy to exploit all potentialities offered by ICTs (Van Beek and Van de Loo 1996). The adoption of ICTs allows the achievement of product and process innovations and thus supports the process of revitalization of the sector.

From a conceptual point of view, validation of the subject requires a reexamination of the process of adoption of ICTs within organizational processes. A critical consideration in this process is how organizations perceive their achieved economic advantages, when ICTs were adopted within organizational processes.

The outlined theoretical reflections are used as a starting point for our empirical research. As repeatedly mentioned in the literature study, adoption of ICTs within organizational processes is directly related to the objective of an organization to achieve higher economic advantages. In the empirical part, the focus will be on the link between two constructs, viz. *the adoption of ICTs in organizational processes* and *the perception of achievable economic advantages*. The first construct encompasses:

- enhanced information flows;
- spatial consequences for the organizational structure;
- restructuring effects that occur after adoption.

The second construct incorporates the following three subconstructs discussed already above:

- efficiency;
- effectiveness;
- competitive advantage.

The components of the first construct will be used to build up various testable hypotheses on the impacts of ICT adoption in the Italian banking sector. The various hypotheses are concisely listed in Table 4.6a. The components of the second construct will be used as (pairwise) discriminating background factors describing the various economic benefits involved in adopting ICTs in the banking sector.

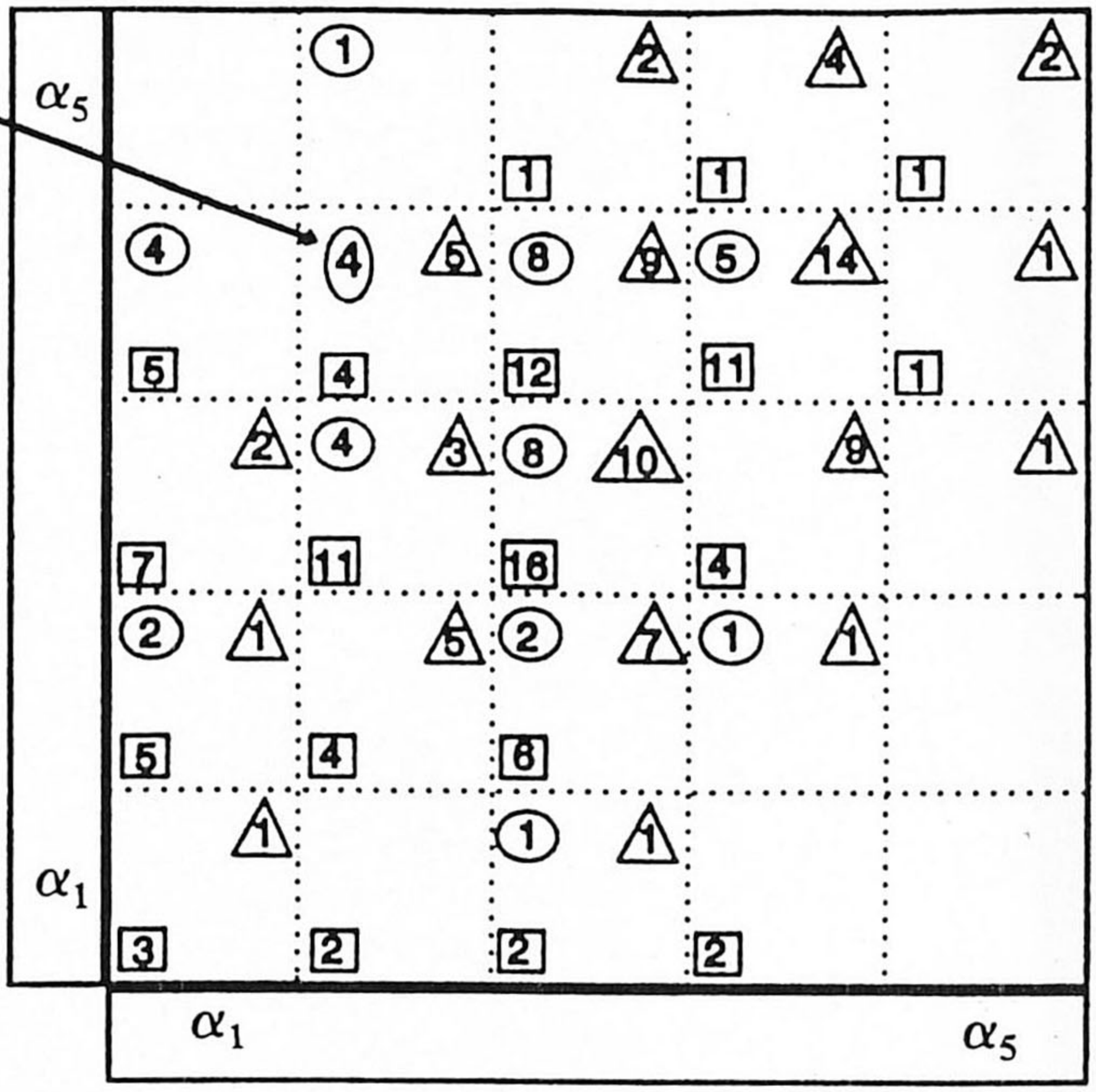
Table 4.6a
Hypotheses on ICT impacts

Table 4.6b
Test results

Hyp	*'The more ICTs are used to achieve higher economic advantages, the more likely it is that...*	*Supported?*
	ENHANCED INFORMATION FLOWS	
H_1	... the organization will go through successive phases of adoption of enhanced information flows'.	YES
H_2	... the organization will match enhanced information flows to a large extent'.	YES
	SPATIAL CONSEQUENCES FOR THE ORGANIZATIONAL STRUCTURE	
H_3	... the majority of the administrative activities will be done in the headquarters'.	YES
H_4	... the majority of the operating activities will be done in the branches'.	YES
H_5	... the majority of the control activities will be done in the headquarters'.	YES
H_6	... the majority of the strategic and planning activities will be done in the headquarters, and the majority of the decision-making linked to operating activities will be done in the branches'.	NO
	RESTRUCTURING EFFECTS THAT OCCUR AFTER ADOPTION	
H_7	... various effects will occur, while going through successive phases of adoption'.	YES
H_8	... various effects will be matched to a large extent'.	YES
H_9	... within the organization various successive innovative effects will occur'.	NO
H_{10}	... within the organization various successive effects on the production process will occur'.	NO

Source: Van Beek and Van de Loo (1996).

Table 4.7
Synthesis of hypothesis 1.7 and 2.8



Legend

P = pairwise relationship effectiveness & competitive advantage
O = pairwise relationship effectiveness & competitive advantage
Δ = pairwise relationship efficiency & effectiveness

Source: Van Beek and Van de Loo (1996).

Table 4.7 shows the synthesis regarding the most important relationships outlined in the empirical study of the Italian banking sector, whereby a coupling is made between respectively H_1 and H_7, and H_2 and H_8, because these two 'couples' of hypotheses have the same structure as regards their contents. For each element of the first construct – the enhanced information flows, spatial consequences and emerging effects – the existence of a relationship with the second construct – efficiency, effectiveness, and competitive advantage – is investigated. For example, regarding the enhanced information flows in terms of efficiency a distinction is made between the level of automation in the front and back office of the bank. Regarding the construct effectiveness a distinction is made between liquidity management, production and distribution of debt and credit services (electronic banking, transfer of funds between banks and central stock management). Regarding the construct competitive advantage a distinction is made in the production and distribution of debt and credit services (cash dispenser, credit card, home banking, cash management, multicurrency netting and point of sale). Then for example the construct 'enhanced information flows' is related to the second construct (efficiency, effectiveness, and competitive advantage) and a ranking is given ranging from α_1 to α_5. The bold printed number 4 in Table 4.7 (see arrow) refers to the relationship between efficiency and competitive advantage regarding the enhanced information flows, and means that 4 banks indicated that the level of efficiency regarding the enhanced information flows was very good (score α_4), but that the achieved level of competitive advantage was fair (score α_2) on the same construct of the enhanced information flows.

From Table 4.7 can be concluded that most of the data (52/78 = 67%) referring to the relationship between the subconstructs efficiency and effectiveness, can be ranked between the graduations good and excellent. This indicates that Italian banks have reached a workable level of efficiency and effectiveness on the three different constructs. In the near future more attention is needed for the other subconstruct relationships, since 47/98 = 48% of the banks have reached a workable level of effectiveness and competitive advantage on the three different constructs. It is interesting to see that Table 4.7 indicates that Italian banks have completed the first phase of integration of ICTs within their organizational processes, characterized by increases in the internal efficiency. Table 4.7 also suggests that there is still a long way to go before the second phase – and especially the third phase – is achieved in all its aspects. For a more thorough analysis on hypotheses 3, 4, 5, 6, and 10 as stated in Table 6a, we refer to Van Beek and Van de Loo (1996).

4.5 Lessons

Facing the technological changes which are pervading the financial sector, banks have to deal with considerable problems of internal reconversion on both a macro

and a microorganizational level. The purpose of the present empirical research has been to investigate these changes and to outline the fundamental tendencies which are characteristic for the Italian financial sector. The increasing degree of competitiveness, which can be observed on both the internal and international market (Europe 1992), forces the banks to adopt ICTs. These ICTs will turn out to be the success factor for the revitalization of the banking sector in the 1990s.

The erosion of the traditional oligopoly, typical of the Italian financial market, together with the high degree of maturity of the banking services, forces the banks to formulate new strategies. These strategies have to guarantee an enrichment of the range of products and services offered, and an increase of the internal efficiency. These objectives can be achieved through the adoption of ICTs, like computer networks. Recently, processes of networking, with subsequent phases of modernization, have been added to the processes of automation, present since the 1960s, to improve the internal functional structure.

The pervasiveness of this phenomenon is verified through the introduction of computer networks in all banking relationships. These can be divided into intrabank, interbank and bank/market relationships. The information flows, transferred over a network, are characterized by individual data and one-way information between functions or departments, where the hierarchical relationship is obvious. However, there is still a long way to go to the networking of two-way flows, which are characteristic for decision making processes and negotiations. The adoption of computer networks leads to innovative effects in each different functional area. These effects manifest themselves in process innovations, product innovations, functional innovations, managerial innovations and innovations regarding the distribution of services. All these innovations improve the banks' position on the market.

A first organizational problem, which arises out of the introduction of the ICTs, is the functional centralization/decentralization between headquarters and branches. The actual tendency seems to be centralization of routinized and standardized functions, which are linked to administrative and bureaucratic operations. The branches are relieved from standardized work, thanks to a business index and data processing centre. Thus, the relationship with the customers is completely decentralized towards the branches. The branches become real and proper points of sale where the market demand is monitored. The headquarters will always be in charge of management and control activities as well as the traditional strategic activities: the 'power' remains therefore centralized, even though the degree of autonomy and responsibility of each of the branches is inclined to change. Furthermore, the importance of some business functions changes through the introduction of ICTs. This change can be observed in the transition from the 'traditional bank' to the 'industrial bank': It is no coincidence that the importance and the weight of functions like marketing, business management, and management of organizational/information systems, increase in the overall business strategy.

Marketing strategies, so called external strategies, are refining the banks' tactics to approach the market. These strategies include policies which support the adoption of ICTs (with the marketing of new on-line services) and at the same time policies which are supported by the adoption of ICTs (with the exploitation of marketing databases for the sale of specific services). For this reason, there is a strong interaction between technological innovations and marketing activities, although data bases for this kind of activities are still scarce, expensive and not very flexible to the needs of the banks in Italy.

Management activities, so called internal strategies, can be supported through ICTs, with the introduction of expert systems, which permit better assistance to ease decision making processes. When introduced at a more elevated hierarchical level, however, the ICTs encounter great difficulty, since they fulfil only a supportive role, rather than a substitutive role of traditional activities. It is important to underline how ICTs, when adopted, create opportunities for the banks to achieve economic advantages of a different nature.

The phase of automation has enabled banks to increase the internal *efficiency*, through the streamlining of functions, which were traditionally performed with the use of much more human resources and time (for example administrative activities). Through networking, however, it is possible to achieve even higher economic advantages. Networking enables a bank to achieve a higher level of *effectiveness*, thanks to numerous process and product innovations in different functional areas.

To achieve *competitive advantages* from ICTs, banks have to adopt modern private infrastructures. However, to achieve higher economic advantages through the use of these networks, they have to deal with organizational changes required to exploit the technological potential in an appropriate way. The simple existence of networks for data transfer does not guarantee the achievement of competitive advantage, because the adoption processes of ICTs need to be supported by an appropriate organizational structure. In order to let ICTs become strategic weapons, they have to *interact* with the variables technology/organization/business strategy. With the results from the empirical part in mind, it can be concluded that generally Italian banks have not yet reached this level of adoption of ICTs.

ICTs offer a great range of opportunities for competitive advantage, when introduced to support the production process. In this area it is possible for the banks to achieve a sustainable competitive advantage on the long term: the key to success, frequently little understood and above all expensive, is to implement ar organizational innovation, which is able to adopt and exploit the ICTs in a better way. This pattern has yet not been pursued by banks, because they are still of opinion that the development of ICTs to approach the market is more useful and has more priority, in order not to lose their image and their positioning in the market. A final economic advantage that can be exploited by the banks, thanks to the use of ICTs, is defined by *cooperative advantages*, which arise from the exploitation of interbank networks.

The actual developments in the financial sector force banks to respond to increasing competition (from both foreign suppliers and suppliers 'outside' the banking sector), deregulation, development of one single European market, alternative distribution channels (electronic and virtual banking) and customers who are becoming more critical ('shopping' and new 'combinations'). Banks should respond to these developments with proper strategies of revitalization: by merging with other banks or parties, by better connecting the distribution channels to the needs of the customers, by innovating the range of products and services and by commercializing the management. Generally, this implies a rethinking of the business objectives and organizational processes.

Strategies of revitalization result in an improvement through successive jumps of the output of organizational processes. This does not automatically imply that the required changes are realized in 'one big jump'. Usually, implementation takes place in various phases. Strategies of revitalization can yield considerable advantages, but its success is influenced by the following critical success factors:

- a balance between organizational processes, ICTs and human resources;
- adequate attention for the 'soft' aspects of the change;
- early and active management of this change;
- unequivocal and purposeful communication.

This chapter has focused mainly on the first critical success factor, i.e. the balance between organizational processes, ICTs and human resources. A well formulated strategy of revitalization is characterized by a good balance between all these aspects. ICTs are playing a more and more crucial role in the competitive process of banks. In addition to the automation of routinized activities, ICTs are frequently used to increase the competitive power (knowledge based systems), to watch over and to manage the total process flows (workflow systems) and to measure, manage and control the output of the process (management information systems). We may conclude from our theoretical and empirical analysis that an innovative and strategic policy on ICTs requires specific attention for the following issues:

- *a tight link between organizational processes and systems* (through an unequivocal and flexible process architecture),
- *an ICT-architecture which is ready for the future*,
- *knowhow of modern banking processes* in a rapidly changing business environment.

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